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Into this mass of raw food material, are extruded from the walls of the oviduct certain granules which stain as nucleo-somes. These appear singly at first as seen at the edges of the photograph (Plate XXI, Fig. 1). These chromatic bodies seem to multiply by binary divisions and thus produce a progeny of various numbers of staining bodies.

These bodies sometimes group themselves into paired threads, and in some cases separate into distinct groups resembling the anaphase of nuclear mitosis. The cyto-plastids thus seem to act as a miniature cell, containing grouped staining bodies, a surrounding body of plasm, and a definite membrane.

These efforts of the staining bodies to divide and to group themselves gives one the impression that the process is a modified or incomplete sequence of what we see in mitotic divisions of the chromosomes, from which they may be derived.

In the lower animals such as Rhizopods and others, the nucleus buds out into the cytoplasm similar bodies, which undergo analogous binary divisions and finally form a large progeny of staining bodies. Later these group and form new nuclei which surround themselves with a plasmic body, about which a new cell wall is formed. In the Tussock egg these processes seem to stop short of this final result, and produce objects whose fate is to be used as food.

E. W. ROBERTS.

SENESCENCE AND REJUVENESCENCE

The fact that an organism at its individual beginning is "young" and gradually loses some of the powers of youth with the passage of time, is so commonplace that its real significance escapes us. The further fact that one of these older organisms can, in spite of its age, produce offspring which apparently do not have the age of the parent, but are as young as the parent originally was at the beginning, brings us acutely upon the problems at the basis of this book. In what does growing old consist? How does age differ from youth? When reproduction takes place, is youth absolutely restored? If so, do the old materials become young again, or is there some material within the aging body which does not itself grow old?

Many investigators believe that youth is the eternal possession of the germ-plasm, and from this the cells of the body form,—these latter alone becoming aged. There is in this view only one process,—senescence. Rejuvenescence is apparent only.

Professor Child, thru the study of the lower forms particularly, in which differentiation is not so pronounced and non-sexual reproduction and regeneration are more frequent, comes to the conclusion that rejuvenescence is not confined to the debatable case of the germ cells, but is found as characteristic a feature of life as is senescence. He finds it also in agamic reproduction, regeneration of lost parts, in the restoration of starved tissues to activity; and the like. The author believes that senescence is not continuous therefore; that it is interrupted now and again by processes essentially restorative of youth; that there is no eternally youthful stuff, but that rejuvenescence and dedifferentiation are just as really a part of the life-cycle as is growing old.

As a criterion of youth one may take as his standard the normal changes which are observed in the embryo formed by the union of gametes,—e. g. rapid growth, cell division, differentiation and other vital processes. Senescence would imply on the other hand a decrease in these dynamic processes. Professor Child undertakes to erect a more exact standard based upon the principle that youth and age may be measured by the rate of metabolism in the organism. As a test of the rate of metabolism, and hence of the youthful or senile tendencies of tissues, the author holds that their susceptibility to certain chemical substances is satisfactory. In solutions strong enough to kill in a short time, the more actively metabolic (younger) objects are killed first; whereas in weaker solution to which acclimation is possible, those more metabolic live longer.

The captions of the five principal divisions or parts will sufficiently indicate the order and scope of the work, which is in large part based upon the author's original researches here given to the world for the first time:—I. The Problem of Organic Constitution; II. An Experimental Study of Physiological Senescence and Rejuvenescence in the Lower Animals; III. Individuation and Reproduction in Relation to the Age Cycle; IV. Gametic Reproduc-

tion in Relation to the Age Cycle; V. Theoretical and Critical. There are seventeen chapters in all.

The book is a worthy illustration of a monographic treatment of a subject instead of in numerous detached papers. The biological workers will be grateful.

Senescence and Rejuvenescence, by Charles Manning Child. Illustrated, 480 pages. University of Chicago Press.

A TEXT BOOK OF HISTOLOGY

Messers Jordan and Ferguson, in this book, have tried to give to students and teachers a treatment of the relatively stable matter of histology which will overcome, thru interest, the difficulties which the average student has in approaching and mastering the subject. There is no doubt that histology may be, and often is, so presented as to be deadening and full of drudgery. Indeed in the opinion of the reviewer this is an indictment that will stand against very much of the work done in College and University laboratories in America today, not alone in histology but in all aspects of morphological work. The writers justly conceive that such interest may be stimulated and held by relating the facts of structure to their practical ends in terms of function; and to their meaning in terms of the generalizations which give vitality and zest to investigation. The student of any science is entitled to the pleasure that comes naturally from following his discoveries on thru into conclusions that relate his facts into a system. Whenever it has been necessary, in order to accomplish this, the authors have not hesitated to introduce the facts of development and of function, and the theoretical explanation which will enable the student to appreciate the facts. This is illustrated, for example, by the discussion of the neuron theory under nervous tissues, and the theories of the inversion of the vertebrate retina in the discussion of the eye. In the opinion of the reviewer they have had good success in accomplishing their announced purpose.

The order of discussion will be made clear by giving the chapter headings. An introductory chapter deals with protoplasm and the cell. Then follow chapters on Epithelial Tissues; Connective Tissues; Muscular Tissue; Nervous Tissues; End Organs; Blood Vessels; Blood; Lymphatic System; Mucous Membranes and